Insecticide Resistance status of *Anopheles* vectors in Timor-Leste

Introduction

- Malaria is a major public health problem in Timor-Leste
- *An. barbirostris* – considered as the primary vector in Timor-Leste
- *An. subpictus* is considered as the secondary vector
- Vector control methods use are;
  1. Long Lasting Insecticide Treated Nets (LLINs)
  2. Indoor Residual Spraying (IRS)

Objectives

Therefore Insecticide susceptibility tests were carried out

- To determine the insecticide susceptibility status of malaria vectors for selection of suitable insecticide for IRS
- Selection of susceptible insecticide which in cooperated into LLINs
- Bio-assay test to estimate the potency (biological efficacy or bio-efficacy) of an insecticide on treated material by examining response of a living organism to it.
- Bio-assay test to assess biological efficacy of an insecticide deposit at various periods after application on different types of surfaces, on adult mosquitoes.
- and detection of onset of a decline in toxic effect (bio-efficacy) occurring due to e.g. ageing, sorption, or other factors.

Methodology

Study area (Sentinel side):

- Suai- Covalima district
- Lore II - Lautem district
- Kampung alor- Manatuto district
- Palapasu, Santa Cruz - Dili district
- Trilolo - Baucau district

Adult mosquito collection method for susceptibility tests

- *An. barbirostris* and *An. subpictus* were collected from Cattle Baited Trap, Indoor Resting Collections
- Larvae surveys carried out and kept for emergence,
- Sugar fed and 3 days old females used

Species were collected

- Ten species of Anopheline mosquitoes were collected
  - *An. aconites*
  - *An. annularis*
  - *An. barbirostris*
  - *An. kochi*
  - *An. maculates*
  - *An. minimums*
  - *An. subpictus*
  - *An. sundaicus*
  - *An. tessellates*
  - *An. vegus*

Insecticide susceptibility test

- Carried out according to WHO Standard Protocol using WHO test kits for mosquito adults (WHO, 2000)
- Maximum 100 female *An. barbirostris* and *An. subpictus* were used to confirm the insecticide susceptibility status
- If the mortality rate in the control is more than 98%

RESULTS
Mortality Rates of *An. barbirostris*

Insecticide	Covalima District	Lautem District	Manatuto	Dilli
DDT	100	100	100	100
Malathion	100	100	100	100
Permethrin	100	100	100	100
Deltamethrin	100	100	100	100
Lambdacyhalothrin	100	100	100	100
Fenitrothion	100	100	100	100
Control	0	0	0	0
No. of mosquitoes	200	150	250	50

Mortality Rates of *An. subpictus*

Insecticide	Covalima District	Lautem District	Manatuto	Dilli
DDT	100	100	100	100
Malathion	100	100	100	100
Permethrin	100	100	100	100
Deltamethrin	100	100	100	100
Lambdacyhalothrin	100	100	100	100
Fenitrothion	100	100	100	100
Control	0	0	0	0
No. of mosquitoes	200	100	150	100

Bioassays Test

Vector	Perma net	Olyset net
An. barbirostris *An. subpictus*	New net-mortality rate 100%	New net- mortality rate 100%
An. barbirostris An. subpictus	2 years old- mortality rate 80% and 70%	To be carried out
	Reason- dried up under direct sun light	
durability	After 2 years- with holes	

Insecticide susceptibility test

An. barbirostris and *An. subpictus* susceptible to

- Deltamethrin
- Permethrin
- Fenitrothion
- DDT
- Malathion
- Lambdacyhalothrin

Conclusion

- An. *barbirostris*, and *An. subpictus* suceptible to DDT, malathion, fenitrothion, permethrin, deltamethrin and lambdacyhalothrin
- Permethrin and deltamethrin impregnated bed nets can be used
- DDT, malathion, fenitrothion and lambdacyhalothrin can be used for IRS
- Lambdacyhalthrin is recommended for IRS for 4 years.
- If the mortality rate reduce more than 80% lambdacyhalothrin should be replaced with a chemically unrelated insecticide such as organophosphate group insecticide E.g. Malathion or Fenitrothion
- However after 4 years insecticide group (pyrethroid) change to a organophosphate to reduce the emergence of insecticide resistance against pyrethroids
- Susceptibility tests should be carried out to detect the susceptibility levels of vectors.
- Bioassay tests should be carried out to determine the efficacy of impregnated insecticide on the sprayed surface and impregnated in the nets

Thank you